

LORENZO ROSA

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CAREER OBJECTIVES

I am an environmental scientist and engineer studying climate change mitigation and adaptation strategies. My work aims to assess the potential benefits and unintended climate and environmental consequences of innovations engineered to satisfy the increasing global demands for water, energy, and food.

EDUCATION AND ACADEMIC DEGREES

2017 – 2020	UNIVERSITY OF CALIFORNIA BERKELEY <i>Ph.D. in Environmental Science, Policy, and Management</i> <ul style="list-style-type: none">Focus on: Energy and environment, Water Sustainability, Water-Energy-Food Nexus.Mentors: Paolo D'Odorico (Advisor), Dennis Baldocchi, Inez Fung, Jeffrey Reimer.Dissertation title: Global Water Challenges of Food and Energy Systems in the 21st Century.	Berkeley
2014 – 2016	POLITECNICO DI MILANO <i>Master in Environmental Engineering (Magna cum Laude)</i> <ul style="list-style-type: none">Focus on: Energy Processes, Hydrology.Thesis title: The Water-Energy-Food Nexus of Production from Shale Oil, Shale Gas and Oil Sands.	Milan
2011 – 2014	POLITECNICO DI MILANO <i>Bachelor in environmental and Civil Engineering</i>	Milan

SCIENTIFIC APPOINTMENTS

2022 – Present	CARNEGIE INSTITUTION FOR SCIENCE, DEPARTMENT OF GLOBAL ECOLOGY <i>Staff Associate.</i>	Stanford
2020 – 2021	ETH ZURICH (SWISS FEDERAL INSTITUTE OF TECHNOLOGY) <i>Postdoctoral Research Scientist, Department of Mechanical and Process Engineering, Institute of Energy and Process Engineering.</i> <ul style="list-style-type: none">Focus on: Carbon Dioxide Removal Technologies, Net-zero Carbon Emissions, Hydrogen.	Zurich

RESEARCH EXPERTISE AND INTERESTS

Water-Energy-Food Nexus, Energy and Environment, Water Sustainability, Agriculture, Climate Change, Global Sustainability, Spatial Data Science and Modelling, Carbon Dioxide Removal.

AWARDS AND FELLOWSHIPS

2021	AGU Science for Solutions Award. Internationally recognized award in recognition of significant contributions in application and use of the Earth and space science to solve societal problems.
2020	Forbes 30 Under 30 Europe, Science and Healthcare list. Listed among the 30 most influential young leaders in Science and Technology.
2020	2020 UC Berkeley ESPM Distinguished Lecture by an outstanding finishing student. Important seminar awarded to the best finishing PhD student in the department.
2019 – 2020	AGU Horton Hydrology Research Grant. Internationally recognized hydrology research grant awarded to three PhD students per year.
2018 – 2020	InFEWs Fellow, Blum Center for Developing Economies, UC Berkeley.
2017 – 2020	Ermenegildo Zegna Founder's Scholarship. Highly competitive Italian scholarship for post-graduate studies abroad.
2017 – 2018	Carbon Neutrality Initiative Fellowship, University of California Office of the President.
2017	Starter Grant Funding, Department of Environmental Science Policy and Management, UC Berkeley.
2016	Gustavo Sclocchi Thesis Award, Society of Petroleum Engineers Italian Section.
Spring 2016	Thesis Abroad Award to develop my master thesis at University of Virginia.

- Spring 2015 ▪ Erasmus Plus Scholarship to attend KTH Royal Institute of Technology.

RESEARCH GRANTS

- 2021-2022 ▪ Swiss Federal Office on Energy, Pathways to an efficient future energy system through flexibility and sector coupling (PATHFNDP), Co-PI (\$4M total, \$125,000 to finance my postdoc).
- 2020 ▪ Environmental Resilience Institute at the University of Virginia, Water Futures Initiative Fellowship (\$20,000).
- 2020 ▪ American Geophysical Union, AGU Horton Hydrology Research Grant (\$10,000).

TEACHING EXPERIENCE

- Spring 2021 ▪ *Teaching Assistant, CO2 Capture and Storage and the Industry of Carbon-based Resources.* Lecturing and grading a course with 200 students.
- Spring 2020 ▪ *Graduate Student Advisor, Data Science Capstone Course.* Mentoring data science students in machine learning projects on environmental sustainability.
- Spring 2019 ▪ *Graduate Student Instructor, Sustainable Water and Food Security.* Lecturing and grading a course with ~60 students.
- Fall 2018 ▪ *Graduate Student Instructor, Energy Solutions: Carbon Capture and Storage.* Lecturing and grading a course with ~60 students.
- Spring 2018 ▪ *Graduate Student Instructor, Sustainable Water and Food Security.* Lecturing and grading a course with ~40 students.

MENTORING EXPERIENCE

- Advised Dr. Eros Borsato during his visiting scholar studies at UC Berkeley. This collaboration led to a publication in scientific journal (Borsato et al., 2020).
- Advised Ms. Areidy Beltran-Pena during her PhD studies at UC Berkeley. This collaboration led to a publication in scientific journal (Beltran-Pena et al., 2020).
- Advising Mr. Tom Terlow during his PhD studies at ETH Zurich. This collaboration led to a scientific journal (Terlow et al., 2021).
- Advising Ms. Nicole van Maanen during her PhD studies at Humbolt University Berlin. This collaboration led to a publication submitted for peer-review.
- Advised several undergraduate and master's thesis projects.

ACADEMIC SERVICE AND OUTREACH

- **Peer Reviewer** for between 20-30 articles per year, regularly including: *Nature Food, Nature Sustainability, Nature Water, Nature Communications, The Lancet Planetary Health, Environmental Research Letters, Renewable & Sustainable Energy Reviews, Resources Conservation & Recycling, Geophysical Research Letters, Earth's Future, Water Resources Research, Journal of Hydrology, One Earth, Science of the Total Environment, Global Environmental Change, Journal of Cleaner Production, Frontiers in Sustainable Food Systems, Advances in Water Resources.*
- **Diversity, Equity and Inclusion Committee**, *Carnegie Institution for Science* (2022 – Present).
- **Reviewer:** IEA's Nitrogen Fertilizer Technology Roadmap's report (2021).
- **Research Affiliate**, *OASIS Initiative Berkeley* (2018 – Present).
- **Datasets:**
 - European carbon dioxide removal potential via BECCS: <https://zenodo.org/record/4441678>
 - Monthly global green-, blue-, and economic-water scarcity: <https://zenodo.org/record/3677485>
 - Global sustainable irrigation expansion potential under current and future climate conditions: <https://zenodo.org/record/3995044>
 - Unsustainable virtual water flows embedded in international food trade: <https://zenodo.org/record/2593800>

PUBLICATIONS

Google Scholar h-index: 18, <https://orcid.org/0000-0002-1280-9945>

25 peer-reviewed publications, average impact factor: 14

Published:

1. **Rosa, L.** and Mazzotti, M. Potential for hydrogen production from sustainable biomass with carbon capture and storage (2022). *Renewable and Sustainable Energy Reviews*.
2. Jenkins, W., **Rosa, L.**, Schmidt, J., Band, L., Beltran-Peña, A., Clarens, A., Doney, S., Emanuel, R., Glassie, A., Quinn, G., Rulli, MC., Shobe, W., Szeptycki, L., D'Odorico P. Values-Based Scenarios of Water Security: Rights to Water, Rights of Waters, and Commercial Water Rights (2021). *BioScience*.
3. Zhang, X., Yao, G., Vishwakarma, S., Dalin, C., Komarek, A.M., Kanter, D.R., Davis, K.F., Pfeifer, K., Zhao, J., Zou, T., D'Odorico, P., Folberth, C., Galeana Rodriguez, F., Fanzo, J., **Rosa, L.**, Dennison, W., Musumba, M., Heyman, A., Davidson, E. Quantitative assessment of agricultural sustainability reveals divergent priorities among nations (2021). *One Earth*.
4. **Rosa L**, Sanchez D, Mazzotti M. Assessment of carbon dioxide removal potential via BECCS in a carbon neutral Europe (2021). *Energy & Environmental Science*.
5. **Rosa L**, Rulli MC, Ali S, Chiarelli DD, Dell'Angelo J, Mueller N, Scheidel A, Siciliano G, D'Odorico P. Energy implications of the 21st century agrarian transition (2021). *Nature Communications*.
6. Terlow T, Bauer C, **Rosa L**, Mazzotti M. Life cycle assessment of carbon dioxide removal technologies: A critical review (2021). *Energy & Environmental Science*.
7. Müller M, Penny G, Niles M, Ricciardi V, Chiarelli DD, Davis KF, Dell'Angelo J, D'Odorico P, **Rosa L**, Rulli MC, Mueller N (2021). Impact of transnational land acquisitions on local food security and dietary diversity. *Proceedings of the National Academy of Sciences*.
8. **Rosa L**, Sanchez D, Realmonte G, Baldocchi D, D'Odorico P (2020). The water footprint of carbon capture and storage technologies. *Renewable & Sustainable Energy Reviews*.
9. **Rosa L**, Chiarelli DD, Sangiorgio M, Beltran-Pena A, Rulli MC, D'Odorico P, Fung I (2020). Potential for sustainable irrigation expansion in a 3C warmer climate. *Proceedings of the National Academy of Sciences*.
10. D'Odorico P, Chiarelli DD, **Rosa L**, Bini A, Zilberman D, Rulli MC. The global value of water in agriculture. *Proceedings of the National Academy of Sciences*.
11. Chiarelli DD, Passera C, **Rosa L**, Davis KF, D'Odorico P, Rulli MC (2020). The green and blue crop water requirement WATNEEDS model and its global gridded outputs. *Scientific Data*.
12. Beltran-Pena A, **Rosa L**, D'Odorico P (2020). Global food self-sufficiency in the 21st century under sustainable intensification of agriculture. *Environmental Research Letters*.
13. **Rosa L**, Reimer J., Went M., D'Odorico P (2020). Hydrological limits to carbon capture and storage. *Nature Sustainability*.
14. Chiarelli DD, Passera C, Rulli MC, Ciruolo G, **Rosa L**, D'Odorico P (2020). Hydrological consequences of natural rubber plantations in Southeast Asia. *Land Degradation & Development*.
15. **Rosa L**, Chiarelli DD, Rulli MC, Dell'Angelo J, D'Odorico P (2020). Global agricultural economic water scarcity. *Science Advances*.
16. Borsato E, **Rosa L**, Marinello F, Tarolli P, D'Odorico P (2020). Weak and strong sustainability of irrigation: A framework for irrigation practices under limited water availability. *Frontiers in Sustainable Food Systems*.
17. Graves A, **Rosa L**, Nouhou A, Maina F, Adoum D (2019). Avert catastrophe now in Africa's Sahel. *Nature*.
18. **Rosa L**, Chiarelli DD, Tu C, Rulli MC, D'Odorico P (2019). Global unsustainable virtual water flows in agricultural trade. *Environmental Research Letters*.
19. D'Odorico P, Carr J, Dalin C, Dell'Angelo J, Konar M, Laio F, Ridolfi L, **Rosa L**, Suweis S, Tamea S, Tuninetti M. (2019) Global virtual water trade and the hydrological cycle: Patterns, drivers, and socio-environmental impacts. *Environmental Research Letters*.
20. **Rosa L**, D'Odorico P. (2018). The water-energy-food nexus of unconventional oil and gas extraction in the Vaca Muerta Play, Argentina. *Journal of Cleaner Production*.
21. **Rosa L**, Rulli MC, Davis KF, Chiarelli DD, Passera C, D'Odorico P (2018). Closing the yield gap while ensuring water sustainability. *Environmental Research Letters*.
22. D'Odorico P, Davis KF, **Rosa L**, Carr J, Chiarelli DD, Dell'Angelo J, Gephart J, MacDonald G, Seekel D, Suweis S, Rulli MC (2018). The global Food-Energy-Water Nexus. *Reviews of Geophysics*.
23. **Rosa L**, Davis KF, Rulli MC, D'Odorico P (2018). The Water-Energy Nexus of hydraulic fracturing: A global hydrologic analysis for shale oil and gas extraction. *Earth's Future*.
24. Chiarelli D, **Rosa L**, Rulli MC, D'Odorico P (2018). The water-land-food nexus of natural rubber production. *Journal of Cleaner Production*.
25. **Rosa L**, Davis KF, Rulli MC, D'Odorico P (2017). Environmental consequences of oil production from oil sands. *Earth's Future*.

Book chapters:

- **Rosa L**, Rulli MC, D'Odorico P. Water stranding in the energy and agriculture sectors: The case of hydraulic fracturing in water scarce irrigated areas (2020). *Routledge*.
- D'Odorico P., **Rosa L**, Bhattachan A, Okin G. Desertification and land degradation (2019). *Springer*.

SELECTED TALKS

- **Rosa L** (2021) "Come rimuovere 280 milioni di tonnellate di CO2 dall'atmosfera", TEDx Reggio Emilia, *Oral Presentation* ([link](#)).
- **Rosa L** (2021) "Carbon dioxide removal via BECCS in a carbon-neutral Europe", *Oral Presentation*, American University, online event. **Invited** ([link](#)).
- **Rosa L** (2021) "Climate change mitigation and adaptation solution to food, energy, and water systems", *Oral Presentation*, Carnegie Institution for Science, Stanford. **Invited**.
- **Rosa L** (2021) "The role of BECCS to deliver negative emissions in Europe", *Oral Presentation*, TCCS Conference, Trondheim.
- **Rosa L** (2020) "Water challenges to carbon capture and storage", *Oral Presentation*, ETH Zurich, Zurich. **Invited**.
- **Rosa L** (2020) "Global irrigation expansion potential", *Oral Presentation*, Stanford University, Stanford. **Invited**.
- **Rosa L** (2020) "Agricultural economic water scarcity", *Oral Presentation*, Stanford University, Stanford. **Invited**.
- **Rosa L**, Chiarelli DD, Tu C, Rulli MC, D'Odorico P (2019) "Loss of environmental flows induced by virtual water trade", *Oral Presentation*, American Geophysical Union Annual Fall Meeting, San Francisco.
- **Rosa L** (2019) "Water limits of carbon capture and storage", *Oral Presentation*, American Geophysical Union Annual Fall Meeting, San Francisco.
- **Rosa L**, Beltran A (2019) "Climate change and the global water-energy-food nexus", *Oral Presentation*, UN Climate Change Conference, Madrid, Spain. **Organized a 2 hours side-event in the Italian Pavilion**.
- **Rosa L** (2018) "Closing the yield gap while ensuring water sustainability", *Oral Presentation*, American Geophysical Union Annual Fall Meeting, Washington DC.

ACTIVE MEMBERSHIP IN SCIENTIFIC SOCIETIES

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| 2017-Present | American Geophysical Union |
| 2019-Present | European Geosciences Union |

SKILLS AND EXTRACURRICULAR ACTIVITIES

- Languages: Italian (native), English (fluent), and Spanish (intermediate).
- Experienced with ArcGIS, Adobe Illustrator, and Python.
- I am an avid sportsman (running, cycling, swimming, sailing, skiing, and rowing); running and cycling competitions (2011 Regional Champion in mountain running for men under 20; 2012 Italian Champion in mountain running).
- In my free time I like to read business media such as The Wall Street Journal, Bloomberg, and Financial Times.

SELECTED MEDIA COVERAGE

- 2021
- Illuminem, "Is Sweden becoming the World leader on BECCS?", Robert Hoglund. 2021. <https://illuminem.com/energyvoices/1e5e9828-a0c2-4215-8f7f-86e68b1d1488>
 - Circle of Blue, "In climate talks, plans to keep planet from overheating should not ignore water", Brett Walton. 2021. <https://www.circleofblue.org/2021/world/in-climate-talks-plans-to-keep-planet-from-overheating-should-not-ignore-water/>
 - Grist, "U.S. Southwest, Already Parched, Sees 'Virtual Water' Drain Abroad", Diana Kruzman. 2021. <https://grist.org/agriculture/u-s-southwest-already-parched-sees-virtual-water-drain-abroad/>
 - Alumni Politecnico di Milano, "Climate change? A challenge worthy of engineers". 2021. <https://alumni.polimi.it/en/2021/05/07/il-riscaldamento-globale-e-anche-un-problema-da-ingegneri/>
 - ETH Zurich News. "Climate action potential in waste incineration plants", Fabio Bergamin. 2021. <https://ethz.ch/en/news-and-events/eth-news/news/2021/05/climate-action-potential-in-waste-incineration-plants.html>
 - Science Daily. "Land deals meant to improve food security may have hurt", Jessica Sieff. 2021. <https://www.sciencedaily.com/releases/2021/01/210119194345.htm>
- 2020
- Mongabay India, "Retrofitting coal power plants with carbon capture may lead to increased water stress", Sahana Ghosh. 2020. <https://india.mongabay.com/2020/08/retrofitting-water-scarce-coal-power-plants-with-carbon-capture-may-lead-to-more-stress/>

- Alumni Politecnico di Milano, “A resilient agriculture to cope with climate change”. 2021. <https://alumni.polimi.it/en/tag/climate-change/>
 - ENERGY Wire, “Coal CCS threatened by water scarcity”, Carlos Anchondo. 2020. <https://www.eenews.net/energywire/2020/05/06/stories/1063058803>
 - Renewable Energy Magazine, “New Study Finds Hydrological Limits to CCS”, Jenna Tsui. 2020. <https://www.renewableenergymagazine.com/jenna-tsui/new-study-finds-hydrological-limits-to-ccs-20200518>
 - UC Berkeley News, “New research shows hydrological limits in carbon capture and storage”. <https://chemistry.berkeley.edu/news/new-research-shows-hydrological-limits-carbon-capture-and-storage>
 - Cosmos, “Smarter irrigation could feed millions more”. Natalie Parletta. 2020. <https://cosmosmagazine.com/earth/water/smarter-irrigation-could-feed-millions-more/>
 - Le Scienze, “Più acqua per i campi, più cibo per tutti”, Giovanni Sabato. 2020. https://www.lescienze.it/news/2020/09/03/news/le_scienze_625-4784132/
 - The Conversation. “How fracking plans could affect shared water resources in southern Africa”, Laura Hood. 2020. <https://theconversation.com/how-fracking-plans-could-affect-shared-water-resources-in-southern-africa-147684>
 - Reliefweb, “Investing in girls and women could set stage for peace, development in Sahel”, Alisha Graves. <https://reliefweb.int/report/nigeria/investing-girls-and-women-could-set-stage-peace-development-sahel>
- 2019
- UC Berkeley News, “Researchers say Western Sahel investment needed to avert crisis”, Jacob Shea. 2019. <https://nature.berkeley.edu/news/2019/11/uc-berkeley-researchers-nature-investment-western-sahel-needed-avert-collapse>
 - The Daily Californian, “UC Berkeley researchers urge governments to take action in western Sahel region”, Emma Roohofada. 2019. <https://www.dailycal.org/2019/11/19/uc-berkeley-researchers-urge-governments-to-take-action-in-western-sahel-region/>
- 2018
- Mongabay India, “Fracking or food: A water-heavy way to extract shale could threaten crop growth in parts of India”, Sahana Ghosh. 2018. <https://scroll.in/article/886020/fracking-or-food-a-water-heavy-way-to-extract-shale-could-threaten-crop-growth-in-parts-of-india>
 - Physics World. “Sustainable irrigation could feed extra 2.8 billion people”, Kate Ravilious. 2018. <https://physicsworld.com/a/sustainable-irrigation-could-feed-extra-2-8-billion-people/>